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ABSTRACT

A pilot study to develop a feasible multi-media index to regional material has just been completed. Its primary objective is to develop a tool for general user access to information in various formats by combining old and new methods and techniques of information retrieval. Simple computer programs manipulate the information on 106 sample items to produce a register of the items and the access indexes: issuing body/main entry, title and series, and subject/descriptor. Indexing terms were assembled from headings assigned by Library of Congress, Sears, and "Readers' Guide" as well as from thesauri such as "Thesaurus of Engineering and Scientific Terms" and "Thesaurus of ERIC Descriptors." The report seeks to avoid undefined jargon of both the library and the computer in the 72 pages of discussion and the appendices. It includes a study of the indexes sampled for regional material and an estimate of the quantity of material and the cost of developing the multi-media index it hopes to pilot. It includes an additional 27 pages of computer printout for the 106 items handled. (Author)

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A CONTRIBUTION TO REGIONAL BIBLIOGRAPHY:

ALASKA

A PILOT STUDY IN INDEXING

By

Margaret P. Harris

September, 1972

Fairbanks, Alaska

LI 004 084

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This Study Is Dedicated

To

My Husband

Quinton

For His Enduring

Patience And Understanding

As A Library Widower

And To

All Others Who Have Sought In Vain

A Central Source Of Information

On ALASKA

PREFACE

The great need for access to material dealing with Alaska has long been the concern of researchers and specialists as well as others seeking information. This need and the desire for information have grown rapidly since World War II, statehood, and oil exploration and development. These in turn have increased the quantities of material produced and, consequently, complicated the search for information. The need has been partly met by several general, selective bibliographies and by others covering specialized subject areas. However, there is no comprehensive, central source that can guide those seeking information through the maze of material available in many different physical forms. At present much costly, repetitive searching is necessary.

With these things in mind, several concerned individuals discussed the feasibility of compiling a multi-media tool for the general user. As early as 1968, general scope and procedural guidelines were drawn up to produce such a tool, but not until 1971 was a study undertaken.

The present study was made possible by the University of Alaska through a six months leave grant to a staff member and the subsequent support of its Rasmuson Library. The Division of State Libraries, Alaska Department of Education, gave financial support. It is hoped the accompanying report will justify the greatly appreciated support of both.

Many interested individuals have generously given professional support, advice, and encouragement to the project. Especial thanks are due:

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INTRODUCTION

The Alaska Legislature realized the inherent value of a comprehensive index to Alaska related materials when it passed House Concurrent Resolution No. 29 in 1971. This resolution (Appendix A) requests the Department of Education to develop such an index as part of a program to provide access to Alaska materials through bibliographic control. It seeks also, to provide a method of updating the only published comprehensive, general bibliography of Alaska material, A Bibliography of Alaskan Literature, 1724-1924, by Judge James Wickersham. The indexing system devised is to provide a thesaurus of terms and be compatible to the use of the machine.

The need for a study of computer systems and programs presently employed in information retrieval services is implicit in the resolution. Further, indexing systems developed must be molded from the best applicable procedures found to be adaptable to a regional bibliography and index.

Before implementing so large an undertaking, the Director of the Division of State Libraries, who is charged with this index compilation, decided to support a pilot study to determine the problems involved and to estimate the size and cost of the total project. The University of Alaska supported the pilot study, also, by granting six months leave to a library faculty member to conduct it.

The updating of Wickersham's bibliography has long been a concern of many institutions, researchers, librarians, and others in Alaska as well as elsewhere. In 1969 broad guidelines, procedures, and an outline of work to be accomplished in the compilation were formulated, but the

problems of machine use were not included. Therefore, the development of a reasonably adequate and feasible indexing system and programs for machine use to make information accessible to the general user form the main thrust of the present study.

The immediate objectives of the study are first, to estimate the quantities of material and the index entries involved; second, to develop a sample bibliography with feasible computer programmed indexes; and third, to estimate the cost of the total project.

The study falls naturally into the several large divisions of effort shown in the Table of Contents. It should be born in mind that the areas covered warrant much deeper study than time has permitted. Further, this pilot project should be viewed as an initial step in developing the comprehensive bibliography and index.

Despite all there is yet to learn, the writer feels the comprehensive project could well proceed on the basis of the information herein assembled. The extended detail given in several sections of this paper is felt necessary since it furnishes the foundation for the recommendations developed.

PART I

SECTION I

PRELIMINARY STUDY

PART I

SECTION I

PRELIMINARY STUDY

Preliminary study was undertaken to provide background knowledge for the work of the project. From available professional literature and visits to selected indexing and information services using computers, the following discussions seem particularly pertinent to this pilot study.

A. Manual and Machine Information Systems

The term "information system" is broadly interpreted in this report to mean the organization developed to compile, store, and retrieve bibliographic information using printed records, or data, as opposed to the organization developed to perform mathematical computations. The systems studied vary from those using completely man-performed operations to those using machine operations almost entirely.

Systems employing machine, or computer, manipulation of information are generally structured quite differently from those limited to man-performed operations. Manual operations are accomplished, more or less, with a few basic ground rules and a great dependence on the experience, education and skill of the operator. Machine operations, on the other hand, are accomplished only through extremely detailed instructions that seek to duplicate each process involved in the corresponding manual operation. The decision making processes of the human brain, involving elements such as those just mentioned, are not easily duplicated without extremely complex and expensive programming, or instruction. Feasible machine use should, therefore, be limited primarily to routine operations which can actually be performed more satisfactorily by machine than by

manual methods, especially where large quantities are concerned.

B. Information Retrieval By Machine

In any information retrieval there must, of course, be retrievable information or data put into the system. In computer operation, the machine is programmed according to precise, prescribed language and techniques, to act upon the data, or input, to produce the desired results, or output. Most of the systems proven to be satisfactory still require considerable human operation in compiling the data for machine manipulation. This is particularly true in indexing for the human operation must arrange and specify the data units in such a way that they can be identified and listed by the machine. The degree of specificity determines the degree of sophistication and complexity needed in programming the instructions given the machine.

Thus, indexing with elementary programs can produce simple machine printed lists of data, and an array of complicated programs can produce machine compiled indexes. The latter process is known as machine indexing, but it appears feasible only when extremely large quantities of data are involved.

The output from machine aided retrieval of information, then, varies from printed lists or indexes (off-line) to stored data banks (on-line). The first necessitates manual searching, but the latter employs machine searching. Further, on-line service displays the search results on a screen and can, if programmed, display the indexed text, print out the information on paper, etc. INTREX (Information Transfer Experiment) at Massachusetts Institute of Technology in Cambridge is a prime example

of on-line service.[1]

Information retrieval by machine is admittedly expensive, whether off-line or on-line services are used. Consequently, to achieve the most feasible and economical operation it is imperative to follow a logical procedure in developing the individual system used:

1. Determine what outputs, or results, are desired, both now and in the forseeable future.

2. Streamline the manual procedures involved in achieving the outputs by eliminating all unessential activities.

3. Develop feasible machine programs that duplicate these processes without entailing great additional manual operation and that operate with a minimum expenditure of machine time.

During program development, further refinements and adaptations in both manual procedures and basic machine programs will evolve as deeper insight into both is achieved. For instance, in order to sort alphabetically by machine, abbreviations, handled easily in manual sorting, must be spelled out. Alternatives are lengthy, expensive programming to instruct the machine to file individual abbreviations as the corresponding words, or manual alphabetizing, assigning of identification numbers to each unit and then machine sorting on these numbers. Unless one is aware of machine limitations in duplicating manual procedures, however, much time and effort is wasted through trial and error programming.

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[1]Council on Library Resources, Recent Developments, CLR (Washington, D.C.: Council on Library Resources, 1972), No. 39, p.1.

Normally, in program development, a point emerges up to which manual is more economical and feasible than machine operation, and beyond which machine operation appears to offer greater advantages. However, to determine this point in any system there must be constant interaction and adaptation between manual procedures and machine programming.

It becomes obvious that with considerable care on the part of a good information specialist and a good programmer, both of whom are somewhat aware of the other's specialty field, many of the difficulties of machine manipulation of information can be overcome before programs are finalized. Though this work is highly precise and detailed, it does present tremendous challenge in that, among other advantages, many valuable outputs are feasible with the machine which are not with manual operations.

C. Information Retrieval Systems Using Machines

The systems studied are primarily user oriented as opposed to older systems, which are oriented more to the information specialist servicing the system, such as the librarian. In line with today's proliferation of information in almost all fields of knowledge and the do-it-yourself-world, user oriented systems become imperative. The difficulty, of course is in ascertaining who the user is and what his approaches to information searching are, with his varied educational background and experience, among other factors. Therefore, to be effective, one must direct the system to the specialist in a subject discipline, or to the general user, if such there be, and also, provide minimum assistance in using whatever system is chosen.

Information systems directed to the subject specialist are general-

ly more sophisticated than those directed to the general user. It appeared during the visits to indexing services that the more sophisticated the system, the more complicated the information retrieval, and the greater the repetition factor on the search. As an example, INTREX issues a tome of procedural directions and specific language to be used in on-line searching. It also allows instruction by machine once the user has typed the word "begin". The point is that this sophisticated system involves elaborate programming and considerable instruction before the desired information can be retrieved. The repetition factor ranges from 20 to 25 percent and is purposely incorporated to provide a variety of search approaches,[2] but can be frustrating and highly time consuming. In sharp contrast, the newspaper index issued by the Minneapolis Public Library employs comparatively uninvolved indexing searches, procedures, and machine programs in its off-line operation. The former is oriented to the specialist and the latter to the general user.

Not only are information retrieval systems user oriented, but the attendant physical services are also. Mankato State College Library in Mankato, Minn., furnishes a prime example. In one of its collections it employs the innovative, user oriented practice of juxtaposition of different physical forms of material dealing with a particular subject. Microforms, books, pamphlets, vertical files, and audio-visual materials are interfiled on the shelves for user convenience. So far the

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[2]Peg Jackson, Interview recorded at Massachusetts Institute of Technology, Project INTREX, Cambridge, Mass., Oct. 6, 1971 by the writer, Transcription, p.1.

arrangement has proven very valuable for the user, although more space is required for storage.[3]

D. Indexing Methods and Techniques In Machine Systems

There are no standard indexing methods and techniques as such. Great variation exists among the different systems studied with regard to methods and procedures, control and use of descriptors, depth of indexing, scope and arrangement of information, and other factors. Even in the specialized indexes of a particular subject discipline there seems to be little consistency.

In considering the differences in methods and procedures, the most noteworthy are probably those associated with the programming. The more elementary and commonly used programs are KWIC (Keyword in context) and KWOC (Keyword out of context). In their simplest forms, these systems consist of machine rotation of the main words of the title, or title words augmented by descriptors. These words, then, serve as a subject index of sorts. They are really effective in this capacity only when the titles assigned to materials do indicate the content coverage. Since such titles are more common to the sciences than the humanities, KWIC and KWOC are used more frequently in the former. Their wide usage is explained by: "Popularity of these indexes was due to their . . . relative economy and the speed with which they could be produced."[4] However, both systems appear to be interim attempts at bibliographic

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[3]Daniel Lester, Interview recorded at Mankato State College Library, Mankato, Minn., Sept. 20, 1971 by the writer, Transcription, p.2.

[4]Carol Fenichel, Editing the Permuterm Subject Index (Philadelphia: Institute for Scientific Information, 1971), p.1.

control in an effort to simply stay abreast of information proliferation.

In sophisticated programs such as those used by Engineering Index, not only are the programs complex, but also the methods and procedures for compiling the input information. For instance, if an abstract is available as a part of the material, it can be used for assigning indexing terms. If it is not available, the terms are assigned after reading, digesting, and abstracting the material. Developing the indexing terms is very tedious and time consuming. The specialists at Engineering Index, Inc. average about 15 items per day.[5]

With regard to the form of descriptors, i.e., the construction of the terms, and the consistency of their usage, variation ranges from the "free" indexing of INTREX to the strict term control used in Engineering Index. In "free" indexing, the descriptors are generally chosen from the words of the author, who is restricted by his vocabulary only. No term association is provided to aid the searcher (INTREX is contemplating one, however).[6] Therefore, one can readily understand the user's confusion at having to consult a series of synonyms to identify material, as in the case of "altitude", "height", and "elevation". In controlled descriptors, only the approved terms may be used, candidate terms being closely screened before their acceptance. The authority file of the simple operation using controlled terms can thus grow into the sophisticated thesaurus, with "Broader Term", "Narrower Term", etc. of the more complex services. Even in the latter, however, variations exist in

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[5] Stanley Tucker. Interview at Engineering Index, Inc., New York City, by the writer, Oct. 12, 1971, Notes, p.1.

[6] Jackson, op. cit., p.2.

the form the term assumes — a subdivision of a subject, etc.— and the particular term used from among the available synonyms. However, it is hoped that with the continued issuance of comprehensive tools, such as TEST (Thesaurus of Engineering and Scientific Terms) and Thesaurus of ERIC Descriptors, more consistency will be achieved.

The depth of indexing sought by various services also shows variation. The number of subject headings assigned in book cataloging generally ranges from two to four for non-fiction. INTREX averages seven or eight terms per 100 word document, i.e., report, journal article, symposium, etc.[7] The National Institute of Mental Health uses 100-300 subject headings/index terms per record in the machine readable data base services reported in research by the American Library Association.[8] This same report shows an average of 20.9 terms per record, or item, for the services reported, but only 9.5 per record when the National Institute of Mental Health report is excluded in computing the average.

Other varying factors mentioned above result from the differing objectives of the individual services, subjective decisions on the part of indexers, etc. and do not warrant lengthy discussion. However, it should be noted that indexing techniques are being constantly refined and improved. The Permuterm Subject Index of the Institute for Scientific Information in Philadelphia is one of the outstanding recent developments in machine indexing.

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[7] Ibid.

[8] American Library Association, A Guide to a Selection of Computer-Based Science and Technology Reference Services in the U.S.A. (Chicago: American Library Association, 1969), p.16.

SECTION II

SURVEY OF MATERIAL

A survey of Alaska related material reveals the bulk of it issued as books, pamphlets, or periodical articles. The rest, sometimes overlooked, if not called to one's attention, appears as audio-visual items, art forms, archives, newspapers, manuscripts, music and museum collections, etc. It is the contention of the writer that a comprehensive bibliography should include the bulk of Alaska related material, to whatever extent may prove feasible, regardless of its physical form.

This study offers a reasonable quantity estimate of the items involved in such a compilation, primarily on the basis of material appearing since 1924. It also recommends the total number of index access entries needed for these items.

Establishing these estimates involved discussions with a number of informed individuals and considerable sampling of indexes, lists, and catalogs. However, it should be born in mind that these are estimates only. Undoubtedly, factors now unforseeable will influence the quantity of the material and the index entries needed as the compilation of the bibliography progresses. As Marie Tremaine observed,[9] one should probably double the quantity estimate, so laboriously compiled, to obtain a more realistic picture of the actual number of items involved in the comprehensive compilation.

The following report well points up the fact that time and financi-

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[9]Marie Tremaine, Director Emeritus of Arctic Bibliography, generously advised the writer during visits in May, 1969, and October, 1971.

al support beyond the limits of this study are definitely needed to establish a more exact estimate, if it be needed.

A. Printed Material

1. Indexes: book, periodical, book-periodical, and newspaper

A sampling of selected standard indexes was undertaken to estimate the extent of Alaska material listed and to determine the nature and depth of the indexing employed. The forbearance of the reader is sought during the following detailed discussions for they do seem necessary to the study in its pilot capacity.

a. Sampling the indexes

(1) Choice of indexes

The indexing tools chosen for sampling are fairly comprehensive and broad in scope. Although it is felt these include the major part of Alaska related items available through indexes, some of the limitations of the sampling are discussed below.

No attempt was made to cover legal resources other than a sampling of the Index to Legal Periodicals. Specialized subject area indexes, such as Biological Abstracts, Abstracts of North American Geology, and Water Resources Research Catalog, are not covered in the sampling. Again, translation indexes and important arctic and polar indexes are omitted since Arctic Bibliography draws the pertinent items from these to a great extent, except for recent material, as explained later in the discussion of the time lag in the indexes.

Another important, unsampled tool is the microfilmed shelf list of the U.S. Government Printing Office, the most comprehensive listing of U.S. Government publications available. However, since it is

arranged by issuing offices, it does not lend itself to a subject search. Although several classifications within this list were examined, time was not available to search the 118 reels. Happily, the bulk of this material can be located by subject in the Monthly Catalog. However, the shelf list will surely need searching in the compilation of the comprehensive bibliography.

The choice of volumes of an individual indexing tool to be sampled was concentrated mainly at the turn of the decades as, 1969-1971, 1959-1961, etc. This proved a happy one in that events affecting Alaska at these times, such as World War II, statehood, oil leases, etc., stimulated much writing. When an index did not lend itself to this choice, as Arctic Bibliography, issues were sampled at specified intervals throughout the series. Whenever time permitted and sheer physical size seemed to warrant, additional years were also included. Current titles are generally used in the summary, although former titles falling within the sample scope were searched, also.

(2) Procedure

Three part time searchers were carefully instructed in the search and recording procedures to be used. All proved exceptional in understanding the importance of care for detail, quick and thorough in their work, and very conscientious in avoiding an overcount when items were found under more than one descriptor.

The searchers usually began by studying the individual tool as a whole to gain elementary familiarity with its arrangement and scope. Then, entries were sought out under "Alaska" and related subject descriptors and geographical terms. A list of search terms was compiled

from the descriptors under which entries were found. This list, minus subdivisions, can serve as a partial basis for a future thesaurus and is given in this paper as Appendix A.

The procedure for recording and tallying involved entering identifying information on blank index card guides, beginning on the index tab and extending below, to facilitate cross checking. The descriptor term or terms under which the item was indexed and the volume consulted were also noted. The guide cards were then arranged, tallied, and banded together by individual volumes within the file for each indexing tool.

(3) Results

The summary of the sampling is given on pages 19 through 22. Discussion of the results and recommendations is pursued in the divisions following.

b. Nature of the indexes

(1) Scope

Some of the indexes limit themselves to books, books and periodicals, or newspapers, but the majority are concerned with periodicals only. The Congressional Record Index deals with but one individual periodical.

The Monthly Catalog, Government Reports Index, and Nuclear Science Abstracts are limited mainly to book type materials, although the first mentioned does include maps, charts, posters,etc. The first two limit themselves to U.S. publications, while the last includes also those of foreign governments.

Some indexes, as Education Index and Arctic Bibliography,

cover both books and periodicals. The latter shows an almost equal distribution of Alaska related items in volume 15 between books (47%) and periodical articles (53%), when conference papers in journals are considered as periodical items.

Nuclear Science Abstracts and Arctic Bibliography are international in scope and include material in the original foreign language and/or in translations. In volume 15 of Arctic Bibliography, 23% of the Alaska material was published outside the U.S.

Occasional overlapping is found from one indexing tool to another. An instance of this is demonstrated by the periodical Science. Both Readers' Guide and Applied Science and Technology Index cover it despite the fact they are published by the same company. There is considerably more overlap between the Monthly Catalog and Arctic Bibliography. In fact, the latter includes so many U.S. Government publications that this category of material is ignored in the overall estimate of material from this tool. Since none of the indexing tools sampled exhausts the areas within its scope, the indexing overlap, except in the case just mentioned, is considered offset by the additional items to be gleaned later from indexes not sampled and items not included in bibliographic tools.

(2) Time lag

The time between publication date of material and its appearance in an indexing tool is usually reasonably short. In both the Monthly Catalog and Arctic Bibliography, however, the lag extends up to three years or longer. This lag is exceptional in the former, but quite usual in the latter. Of the 6,040 papers in volume 15 of the

latter, published in 1971, but 200 papers bear the imprint date of 1968, the latest included in this volume.[10]

(3) Arrangement and inclusion of material

The Monthly Catalog, Nuclear Science Abstracts, Government Reports Index, and Arctic Bibliography give the full citation for items in a section separate from the index, using item entry numbers for access. All except the first mentioned generally include the additional feature of abstracts, sometimes quite lengthy. In these tools the index section may appear as part of the volume or separately. Cumulative indexes covering a substantial number of years are available except for Arctic Bibliography, which is presently compiling one for its 15 volumes. Except for Monthly Catalog, these indexes are arranged in two columns to the page. Arctic Bibliography alone, uses consecutive entry numbering throughout the series. The other indexes limit entry numbering to the year span concerned.

Identifying information is generally entered by author and/or title under the index descriptor, except in the New York Times Index. This does not specify the title of an article, or give headlines, but rather, identifies material under the descriptor term by the date of the paper's issue and a brief annotation.

(4) Descriptor terms

In this study, descriptor terms refer to both subject and geographical, but not to other indexing terms, such as title.

Many indexes examined are geographically oriented, with

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[10] Arctic Institute of North America, Arctic Bibliography (Montreal and London: McGill-Queen's Univ. Press, 1971), vol. 15, p.v.

entries under "Alaska", its subdivisions and phrase headings, or under "Alaska" as a subject subdivision, as in "Botany - Alaska". Some indexes use both approaches and items appear under both "Botany - Alaska" and "Alaska - Botany". However, identical entries do not necessarily appear under these similar descriptors. In the sampling a reasonably accurate estimate necessitated much cross-checking to avoid overcount.

It should be noted that Arctic Bibliography has developed such fine shades of meaning and scope relevance between similar terms that long, tedious searching is necessary to sift out Alaska related material by the index entry approach. This is further illustrated by the following, somewhat different type of example: under "Aleutian Islands" one must determine which items concern Alaska only and which concern Russia.

There can be great variation within the individual tool from one volume or year span to another and inconsistencies in indexing exist even within a single volume. Some of these variations are attributable to human error, some to subjective indexing, some to changing terminology, and yet others to machine indexing approaches now being implemented in the more recent volumes of several tools.

Indexes that employ a subject approach only, as mentioned above, generally deal with specific subject disciplines and hence require lengthy searching for Alaska material. Notables of this type are Bibliography of Agriculture, Engineering Index, Index Medicus, and Index To Legal Periodicals. Of these, the last mentioned, alone, was examined because of the lengthy search time involved. However, it should be noted that relevant entries in the first three indexes are fairly well covered

in Arctic Bibliography, except for current material.

The variation in descriptor terminology from one tool to another, aside from geographical entries, is surprisingly small. Although only a limited number of terms are common to more than two indexes, many of the major descriptors are common to most of them. The greatest variation seems to be in the degree of specificity, as opposed to the generality of the indexing terms assigned.

(5) Depth of indexing

As could be expected, there is some variation in the depth of indexing, but not to the degree anticipated by the study. The number of descriptor terms used was tallied for the following: Applied Science and Technology Index, Arctic Bibliography, Monthly Catalog, and Readers' Guide.

Readers' Guide leads in the use of but one descriptor, followed closely by Applied Science and Technology Index, with Arctic Bibliography showing almost one-third of its items listed under but one descriptor. In the use of two descriptors, Monthly Catalog leads with over half its items and Applied Science and Technology Index uses two descriptors for slightly more than one-fourth of its items. Monthly Catalog leads also, in the indexes using three or more descriptors, for a bit more than one-third of the items. Arctic Bibliography, surprisingly, for it occasionally employs six or more descriptors for some items, shows not quite one-fifth of the items using three or more terms. E. M. Smith states that, "Each publication included in the register is indexed for its subject matter (often subdivided for region) and also under the region in which the work was done (subdivided for subject)"

in her study of Arctic Bibliography.[11] However, the survey's finding of about one-third of the Alaska items using but one descriptor may reflect the fact that periodicals average fewer descriptors than books, since about half the items are periodicals. Again, a large number of items may not be concerned with research, as items from the Alaska Sportsman, a magazine.

It would seem from the sampling that the average number of descriptors can be considered one to two for periodicals and two to three for book materials.

TABLE 1

ANALYSIS OF ITEMS PUBLISHED OUTSIDE U. S.: ARCTIC BIBLIOGRAPHY V. 15

Total Items	% of Total = Ak. Items	% Ak. Book Items	% Ak. Per. Items	Breakdown By Country	
269	24	30	70	Russian	43.5
				English	19.3
				Canadian	17.1
				Swedish	4.5
				Japanese	4.5
				Other	11.1

Distribution of Descriptors

% Items Using:

1/Item	2/Item	3 or More/ Item
34	45	21

[11] E. M. Smith, Arctic Bibliography, Canadian Library Association Occasional Paper no. 79, (Ottawa, Canada: Canadian Library Association, 1970), p. 10.

TABLE 2

OVERALL SAMPLE AVERAGE ENTRIES/ITEM

Index Name	Sample Size	1/Item %	2/Item %	3 or More/ Item %
Applied Science & Technology Index	10 yrs.	70	28	2
Arctic Bibliography	v. 15	33	49	18
Monthly Catalog	3 yrs.	10	55	35
Readers' Guide	11 yrs.	77	19	4
Book Indexes Average*	———	21.5	52	26.5
Per. Indexes Average	———	73.5	23.5	3

* The percentage of 2/Item and 3 or More/Item is actually higher for books than for periodicals for almost half the items in Arctic Bibliography are periodicals.

TABLE 3

INDEXES SAMPLED: 1925 to 1972

INDEX NAME	SUMMARY					PROJECT ESTIMATE		
	YRS. SEARCHED	SEARCH TIME/HRS.[1]	ITEMS FOUND	MIN/ ENTRY[2]	ENTRIES/ YR.	TOTAL YRS.	SEARCH TIME/HRS.	ENTRIES
APPLIED SCIENCE & TECHNOLOGY INDEX 1925-	9	17 (S & R)	238	4.25 (Allow 6/ entry)	26	47	122	1,222
ARCTIC BIBLIOGRAPHY V. 1-15	7 vol.	245 (S & PR)	5,992	2.45 (Allow 4/ entry)	856/ vol.	15 vol.	856	12,840
ART INDEX 1929-	12	.5 (S only)	26	1.15 (Allow 3/ entry)	2	43	5	86
BUSINESS PER INDEX 1958-	6	1 (S only)	451	.132 (Allow 2/ entry)	75	14	35	1,050
CANADIAN PER INDEX 1948-	1	.33 (S & PR)	11	2 (Allow 3/ entry)	9	24	11	216
CONG RECORD 1925-	12	.75 (S only)	1,617	.027 (Allow 3/ entry)	135	47	317	6,345
EDUCATION INDEX 1929-	6	3.5 (S & PR)	46	4.5 (Allow 6/ entry)	8	43	35	344
GOVT REPORTS INDEX 1966-	1.5	.33 (S only)	107	.06 (Allow 1/ entry)	71	6	7	426
INDEX TO LEGAL PER 1925-	19	2.75 (S & PR)	20	8.25 (Allow 10/ entry)	1	47	8	47

TABLE 3 (cont.)

INDEXES SAMPLED: 1925 to 1972

INDEX	SUMMARY YRS. SEARCHED	SEARCH TIME/HRS.[1]	ITEMS FOUND	MIN/ ENTRY[2]	ENTRIES/ YR.	PROJECT ESTIMATE TOTAL YRS.	SEARCH TIME/HRS.	ENTRIES
MONTHLY CATALOG OF GOVERNMENT PUBLICATIONS 1925-	15	10 (S & PR)	2,088	3.55 (Allow 6/ entry)	139	47	653	6,533
N. Y. TIMES INDEX 1925-	7	7.75 (S & PR)	709	.754 (Allow 2/ entry)	101	47	158	4,747
NUCLEAR SCIENCE ABSTRACTS 1948-	7	.16 (S only)	164	.06 (Allow 2/ entry)	24	24	20	576
READERS' GUIDE TO PERIODICAL LITERATURE 1925-	13	21.5 (S & PR)	622	2.46 (Allow 4/ entry)	484	47	150	2,256
SOCIAL SCIENCE & HUMANITIES INDEX 1925-	11	11.75 (S & PR)	136	5.1 (Allow 7/ entry)	12	47	66	564
TOTALS	119.5 Yrs. & 7 vol.	322	12,227	—	—	483 Yrs. & 15 vol.	2,443	37,252

1 S=Searching; R=Recording identifying information; PR=Partial recording of information
2 Time allowed for recording full citation and arranging records

2. Book materials

a. Item quantity estimate

As mentioned in the introductory section, there has been extensive effort, especially in the subject disciplines, to establish bibliographic control of Alaska related material in supplement to the Wickersham bibliography. An outstanding, unpublished, general work merits noting here.[12] It consists of a card file and purports to list approximately 8,000 to 9,000 books in all fields, languages, and editions. The compiler states that publications of research institutes, universities, legal bodies, organizations, the U.S. Government, the Alaska State Government, and periodical literature are not covered, except for a few scattered entries. Further, although some works cited are included in the Wickersham bibliography, variant editions and titles within its time scope, but overlooked, are included in this file. The compiler feels, for the sake of a quantity estimate, that any listing of pre-1924 material is offset by the items she may have overlooked since 1924. Since this work is oriented toward the commercial publishing field, rather than the scientific or schólarly, it can serve as a complement to the book estimate made on the basis of the preceding survey.

To this basic estimate of 8,000 to 9,000 items should be added, then, approximately 11,000 to 12,000 U.S. Government publications. This figure is obtained from the summary above and an estimate of items in Research in Education and 3,300 items in the Catalog of Public Docu-

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[12] Elsie Tourville of Fairbanks, Ak., displayed and explained her file to the writer in 1969. The information above reflects the status of the file as of July, 1972.

uments of the Congress and agency or department publication lists.

8,000 to 9,000 items are estimated for the publications of universities, research institutes, organizations, societies, and the Alaska State Government. This figure includes also 900 items published outside of the U.S. and an estimated 3,000 items not listed in indexes.

The overall book estimate made, then, is between 27,000 and 30,000 items of Alaska related materials.

b. Index entry estimate

(1) Descriptor entries

It is recommended that wherever possible, Library of Congress subject headings be adapted for use as descriptors. It must be remembered, however, that their approach is that of cataloging, rather than indexing, by subject (usually broader) rather than by descriptor (usually more specific). Further, their viewpoint is national and international, rather than regional. These factors necessitate the addition of descriptors peculiar to northern areas, perhaps more similar to those used in Arctic Bibliography.

The average number of subject headings assigned for non-fiction by the Library of Congress is estimated at under three. The number of descriptors used in the commercial and government indexing services sampled averages more than two per book. The sample bibliography, which follows in Part II, shows an average of 3.02 descriptors per non-fiction item. The recommended average is therefore, between three and four descriptors per non-fiction item indexed.

Fiction material has not been segregated in the quantity estimate. Since it usually requires no descriptors, but occasionally uses one, the

overall average of three descriptors per item is recommended. On this basis, approximately 81,000 to 90,000 descriptor entries are needed for book material. These are understood to mean the entries that identify individual items in the source register and not the descriptor terms themselves. An estimate of the latter can be made later.

(2) Other entries

In addition to the descriptors, entries are needed for the title and series index and the main entry and additional author index. In the sample in Part II the source register serves also as an index to main and added authors. This practice, however, will not be easily accomplished in the bibliography of Alaska materials because of the inconvenience of manually manipulating large quantities of items before assigning identifying numbers. Therefore, a size estimate is made also for the author-issuing body index, including added author entries.

The sample bibliography and its title index show an average of 1.5 entries for titles, including also series entries, and an average of 1.87 entries for authors and issuing bodies. Since the sample consists mainly of U.S. Government publications, which generally require more entries than other types of material, it is estimated an average of 1.3 title entries and 1.6 author-issuing body entries will suffice. This means 35,000 to 39,000 title index entries and 43,000 to 48,000 author-issuing body index entries.

c. Summary

The study estimates there are 27,000 to 30,000 book materials relating to Alaska. 81,000 to 90,000 descriptor entries will be needed, 35,000 to 39,000 title entries, and 43,000 to 48,000 author-issuing body entries for the three indexes.

3. Periodical material excluding newspapers

a. Item quantity estimate

The number of periodical items of concern to Alaska in the indexes sampled was calculated at 18,000. To this should be added an estimate for periodical articles not covered by the sampled indexes, either by not being included at all, or by being only partially indexed, as with the Alaska Sportsman. No attempt was made to analyze the individual Alaska and arctic periodicals, except for a single issue of the Alaska Sportsman. A partial list is included as Appendix C. Change of title, variation in size, number of issues per year, number of years of individual periodicals, and various other complications warrant a special study of this material. A rough estimate would indicate approximately 8,000 to 10,000 items, including foreign articles. This is based partly on the results of indexing a sample issue and the experiences of the personnel in two of Alaska's libraries who are maintaining an index of Alaska Sportsman. The number of articles indexed per periodical issue will vary from three to ten, depending upon some of the factors mentioned above. It is recommended that an average of four to five articles is a feasible number for each issue of the periodicals not indexed in the standard indexing tools.

The total estimate for periodical articles is 26,000 to 28,000.

b. Index entries estimate

It is evident from the summary on the use of descriptors that the more general material, such as that covered by Readers' Guide and Applied Science and Technology Index, can be sufficiently handled with but one descriptor in almost three-fourths of its material. The less

general material appears to require two for over half its material, as shown by Arctic Bibliography and Monthly Catalog. The study recommends using a geographical descriptor if the article deals with other than Alaska in general, and a subject approach for an average of two descriptor entries per item. For the periodical articles estimated, then, 52,000 to 56,000 descriptor entries will be needed.

As with book items, it is recommended that author and issuing body and title entries be used when available. The coefficient for each type of entry, in relation to the items indexed is 1.1 per item. This yields 28,600 to 30,800 entries for each type of index.

c. Summary

An estimated 26,000 to 28,000 periodical items will need 28,600 to 30,800 entries each for the author-issuing office index and for the title index. 52,000 to 56,000 entries are needed for the descriptor index.

4. Newspapers

Approximately 5,000 Alaska items appear in the New York Times, using approximately 10,000 descriptor entries and no title entries. No estimate is available for those appearing in other American and foreign newspapers published outside Alaska. Nor is there information on how many items in Alaska newspapers should be made accessible through indexing. However, it is presumed the last mentioned will yield a quantity large enough to warrant a separate index. Although some indexing has been accomplished, the great bulk lies ahead, including also the papers prior to 1925. Regrettably, the present project could not study this area except to compile the partial listing which appears as Append-

ix D. The list is based primarily on the titles at the Rasmuson Library and those listed in the Wickersham bibliography.

It is recommended the New York Times entries on Alaska be considered in the compilation of Alaska information resources. Further, it is recommended that a pilot study be undertaken for Alaska newspaper indexing and that the indexing terms developed be compatible to those assigned in the descriptor index of the bibliography of Alaska materials. In this way the newspaper index can become part of the overall project with references from the latter to the newspaper resources index.

B. Other Material

Quantities involved will not be large in comparison with printed material. A reasonable estimate would be 5,000 items. It is advised that the bulk of this material, except for much of the audio-visual, be handled by units or collections. Broad descriptors can be entered in the bibliography descriptor index and referrals made to more detailed listings to be found elsewhere. This is especially true of archival, manuscript, and museum material.

1. Audio-Visual material

The item quantity estimate is given at 900 items: films, 200; slides, 50; miscellaneous archival film, etc., 150; and oral tapes, 500. An average of two descriptors and one index entry each for producer or sponsor, etc. and one for title is recommended. This is based partly on the practices at Mankato State College Library.

The total estimate, then, is 900 items with 1800 entries for the descriptor index, 900 for the author-issuing body index, and 900 for the title index.

2. Archival and manuscript material

It is difficult to estimate this material because of unreported statistics and the limitations of this study. The collections in the Rasmuson Library presently number 137 major collections. The holdings of the State Archives, historical societies and museums in Alaska should be added to this, as well as a substantial, but difficult to estimate, quantity of archival and manuscript material in public and private repositories outside Alaska. Here an average of two descriptor and about one and one-fourth author-issuing body index entries seems advisable. A title approach may not be essential and is not estimated.

The estimate total is given at 3,000 items with 6,000 descriptor and 3,800 author-issuing body entries.

3. Microforms

The term "microform" is generally applied to a variety of sizes and types of microfilm, microfiche, microcards, etc. used to reproduce materials available only on a very limited basis. These are usually printed or manuscript materials and are involved in the bibliography for they provide another point of access to items not readily available. No quantity estimate has been attempted.

4. Map, museum, art form, music, and miscellaneous material

Definite information is lacking also for most of these categories except for the fact that U.S. Geological Survey has over 200 maps concerned with Alaska, excluding superceded issues, some of which are listed in the Monthly Catalog. At this point, 1,000 items or collections seems a very minimal estimate. These would require 2,000 descriptor, 1,000 title, and 1,000 author-issuing body entries in indexes.

5. Summary

In rounded numbers, 5,000 items are indicated with 6,000 author-issuing body, 2,000 title, and 10,000 descriptor entries.

C. Summary

TABLE 5

SOURCE REGISTER AND INDEX ENTRIES
(Rounded to thousands)

Type of Material	No. Items	Source Register	Auth-Iss. Body Index	Title Index	Descriptor Index
Book	27-30	27-30	43-48	35-39	81-90
Period-ical	26-28	26-28	28-31	28-31	52-56
News-Paper	5	—	—	—	10
Other	5	5	6	2	10
Total (Rounded)	63-68	58-63	77-85	65-72	153-166

SECTION III

INDEXING MATERIALS

Indexing is broadly interpreted in this report to mean the use of subject and/or descriptor terms to provide reasonable access to information. In order to develop recommendations a sample project was undertaken to list and index items representing material in several formats. The results of the sample project are presented in Part II.

The selection of the included items was based on their relevance to various problems anticipated or encountered in adapting indexing terminology and procedures to machine use. This selection does not imply that these are the only types of problems involved, but rather, that this sample size is minimal for developing reasonably valid recommendations concerning the basic indexing problems.

The items selected date from 1924 into the present and consist mainly of U.S. Government publications because of their particular interest to the study. A notable exception to the date span is the 1900 Compilation of Narratives of Exploration in Alaska, number 000083 in the source register of Part II, and its analytic entries. This is purposely included because of its wealth of resource material, the complexity of its indexing, and the fact that, in the opinion of the writer, neither the Wickersham bibliography, nor Library of Congress cataloging provides reasonable access to its contents. Other exceptions, 000010, 000029, and 000062, are included for the sake of comparison with other volumes indexed.

As stated in Section II above, items dealing with Alaska run the

gamut of variation in physical format. The following discussion seeks to clarify methods of handling these variations. Print, or printed, material is limited to formats employing the alphabet, as opposed to art prints.

A. Identifying Information

1. Main entry

This may take the form of an author, issuing agency or department, artist, musician, photographer, sculptor, originator, periodical title, object, or a number of other entries, depending on the material indexed.

With minor adaptations, Library of Congress rules are followed for the entry form of printed material except in the case of governmental bodies. The Superintendent of Documents entry is used as the authority in the latter because it appears more user oriented. Although some entries are identical in the two systems, when they are not, the Library of Congress entry complicates the search unless the user is aware of the exact wording of the official name. As an example, note the difference in the filing positions of "U.S. Dept. of the Interior" and "U.S. Interior Dept."

Neither of these authorities covers the indexing of newspapers. Since the newspaper may at times be the only source satisfying certain types of research, its indexing must be seriously considered in the multi-media tool contemplated. Two of the greatest difficulties are the sheer volume involved and the fact that access to information is handled quite differently from that involving books, etc., as shown by such tools as the New York Times Index. Recommendations regarding this indexing are covered later in the report.

Non print formats that are not dealt with by the two authorities mentioned above are generally entered according to the rules set forth in Jean Riddle's Non-Book Materials, the Organization of Integrated Collections, published by the Canadian Library Association in 1970.

2. Description of material

Descriptive information given in the sample also generally follows Library of Congress rules for print items and Non-Book Materials for other formats. The latter adapts Library of Congress rules by supplying titles, when needed, and substituting corresponding non-book terms for book terms. As an example, a title is provided for realia in 000014 and the length and size are substituted for book size and pagination.

3. Location of material

The location of material in the sample is primarily the Rasmuson Library, University of Alaska at Fairbanks. When the comprehensive index is undertaken, a union list of locations can be developed by adding others, including those outside the State.

B. Subject/Descriptors

This study seeks to develop an indexing terminology broad and flexible enough to include multi-media material, to be machine adaptable, and to provide a tool for general user access to information. Assigning indexing terms proved to be the most difficult part of the whole study in the reconciling of subject and subdivision approaches with the more recently developed descriptor and descriptor phrase approaches. Some of the compromises developed are apparent both in the following discussions and in the descriptor index in Part II.

Various authorities were consulted, the most often used being

Subject Headings Used in the Dictionary Catalogs of the Library of Congress, 7th ed., Monthly Catalog, Arctic Bibliography, Thesaurus of Engineering and Scientific Terms (referred to as TEST), Thesaurus of ERIC Descriptors, and the Readers' Guide to Periodical Literature (unabridged). An authority file of terms made possible the development of compromises and insured consistency of term usage.

With regard to the depth of indexing, the general user's approach is estimated to involve less than ten search terms for any one item and to average three or four terms. A deeper search can be satisfied by consulting the thesaurus to be developed later for other terms that may occur to the user. The thesaurus will also serve to associate and interrelate the indexing terms used. The depth of indexing employed by the systems studied would seem almost in direct proportion to the funds and expertise available. The following example demonstrates the depth of indexing used by a sophisticated system in a limited subject field. The indexing terms used in the project sample for this material, item 000023, are given as "Chena River", "Water Quality - Chena River", and "Water Composition - Chena River".

BIBLIOGRAPHIC
The Chena River-A Study of a Subarctic Stream, Frey, Paul J., Mueller, Ernst W., and Berry, Edward C., Alaska Water Laboratory, FWQA

ABSTRACT:
The Chena River is a subarctic stream flowing westerly from the low mountains of eastern Alaska to the Tanana River near Fairbanks. It is typical of many Interior Alaska rivers with the exception that its lower reaches are highly polluted by domestic and industrial wastes from the Fairbanks area. The purpose of this 3-year study of the river was to understand the physical, chemical, and biological limnology of the river system and what effect man's influence--past, present, and future--has on the river. Dissolved oxygen was one of the most critical parameters determined. In the summer it is close to saturation. During winter, in the lower river, the concentration approaches 1 mg/l. The biological community was studied through both quantitative and qualitative plant and animal collections. The upper reaches of the river are much richer in number of kinds of organisms than the lower reaches. Coliform bacteria counts range from very low in the upper river to over 500,000 per 100/ml below Fairbanks.

A flood control dam is planned for the river above the city of Fairbanks. Significant modification of the water quality and biota of the river can be expected following the construction of the dam. Proper management of the flow from the impoundment can reduce the objectionable effects of this dam on the river system.

ACCESSION NO.

KEY WORDS:
benthos
break-up
chemical oxygen demand
coliform
dissolved oxygen
diversity
fisheries
flood control
freeze-up
nutrients
plankton
pollution
reaeration
sewage
temperature
water quality

It should be noted that 16 descriptors are listed by the example, but only three by the project sample. Of these, but one term is common to the two. Since it is intended for the specialist, the above sample uses very specific, highly scientific terms, as opposed to the more general ones of the project sample. However, with all the array of descriptor terms, there seems to be no geographical orientation, in this case rather important, namely, "Chena River". Again, the example above is more machine oriented, needs considerably more human effort in the assembling of data, and consumes considerably more computer time and money than the fairly simple programs developed by the study.

In the project sample, the number of descriptors assigned varies with the nature of the material. In general, it is slightly higher than the number used by Library of Congress for the same material because of its regional orientation. This range in the number of terms is shown by 000038 with a length of two pages and using three descriptors, 000083 with three descriptors and a length of 856 pages, and 000051 with nine descriptors and a length of 228 pages.

In developing the terminology and form of the descriptors, the following guidelines emerged:

1. The word "Alaska" is generally dropped since the whole project is concerned therewith. Consequently, the usual subdivisions of Alaska appear as main terms in the descriptor index, as "History" instead of "Alaska - History". Again, a subject term is not subdivided by "Alaska".

2. In general, subdivision is allowed by geographical area or place other than "Alaska", as in "Mammals - Aleutian Islands".

3. Subdivision is also allowed by a limited number of form divi-

sions since form is usually interpreted in this paper to mean physical as opposed to subject form. As an example, "History" is not used as a subdivision in the sample indexing project. The form subdivisions used are mainly "Bibliographies", "Dictionaries", "Indexes", and "Statistics". Physical forms, such as maps, phonotapes, etc., are not used as subdivisions in the interests of interfiling entries of the different media. However, it is recommended that during the compilation of the Alaska bibliography index the need for subdivisions of this nature be carefully reevaluated in the light of the number of entries generated. If a great number of entries develop under one descriptor, some phrase or other subdivision will be needed. When only a few entries are found, then subdivision is not indicated.

4. Dates are also allowable as subdivisions, provided that if there be more than one, the same number of digits appears on either side of the separating hyphen, as "History - 1867-1899".

5. Subdivision by subject is generally not allowed. "Economic Conditions - Pribilof Islands" is used, but not "Pribilof Islands - Economic Conditions". When subject subdivision seems desirable, phrase terms are used. In the foregoing case, the heading would be "Pribilof Islands Economic Conditions". The same would be true also for "History", as "Fairbanks Area History" rather than "Fairbanks Area - History". This development is partly an adaptation to machine usage.

6. Following a practice of Arctic Bibliography, collective terms are used as main headings to gather material of especial interest in one place. Note that in the descriptor index exploring expeditions are entered both under their individual names and under the heading "Explor-

ing Expeditions".

7. Specific rather than general terms are used if the material being processed is specific. For instance, a book on the carving of totem poles would have a descriptor reflecting the words "totem poles" rather than the more general heading "Wood Carving". If more than four subjects are concerned, general headings are used, but in the indexing sample, fewer are usually individually listed. Exceptions to this rule are, of course, allowable when warranted in the opinion of the indexer, as in the case of 000051. This item uses the maximum number of nine possible individual descriptors.

8. When the authorities consulted are in conflict, the choice of descriptors is prejudiced toward the general user and the more specific term. A case in point is "Placer Mining". This is used by TEST, while Library of Congress uses "Hydraulic Mining". The former is considered a narrower term (NT) and the latter a broader one (BT) in TEST, thus allowing the use of either term, depending on the material. Library of Congress does not allow the use of "Placer Mining", as indicated by a "see" reference to "Hydraulic Mining". "Placer Mining" is the more specific of the two terms and deemed more suitable to indexing Alaska material when it is limited to placer mining. Since Library of Congress is undergoing extensive revision and updating of its subject headings,[13] considerable liberty has been taken throughout this study in adapting its headings to an indexing approach.

9. The control and interrelation of the indexing terms used is

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[13]"Semiannual Report on Developments at the Library of Congress, June 1972," L. C. Information Bulletin, 31, No. 25 (June 23, 1972), Appendix, A-83.

very important to this study in assuring consistency. But one of the indexing services visited, INTREX, does not maintain a thesaurus, or master list, of indexing terms. These terms have been developed during the process of indexing rather than by prestructuring except in cases where indexing terms were assigned in conjunction with classification schedules, as in the Library of Congress, Universal Decimal, or COSATI classification schedules. The results of the "free" indexing experiment at INTREX cannot be fully evaluated for several years.

10. Terms are used in the plural form for the sake of consistency when the plural form is implied. This does not exclude the use of the singular form, but gives a different interpretation. For instance, for the sake of indexing the realia item in the sample, the term "Violins" is used, meaning the physical structures, rather than the term "Violin", which refers to other than the physical violin.

C. Title Index Entries

Title entries are made for brief title and subtitle, if applicable. They are also made for identifiable series, as Fauna Ser 5 in 000041. When series have no distinctive title, they are entered under the issuing body as U.S. Geological Survey Bulletin in 000010.

D. Sample Summary

The 106 items indexed in the sample, with the exclusion of the single fiction item, 000012, average 2.92 subject/descriptors per item. Of this overall average, the non print items average 2 and the non fiction average 3.02. The sample also shows 157 title index entries, or a factor of 1.5 entries per item.

EXAMPLES GIVEN FROM THE SUMMARY

Added entries: U S Biological Survey (000029)

Archival material: 000019

Autobiographies: 000018, 000042

Bibliographies: 000007, 000090

Biographies: 000030, 000042

Compilations: 000083

Contents notes: 000083

Cross references: Khleknikov, Alaska Library Assn, Northern Commercial Co

Dictionaries: 000010

Editions: 000010, 000045, 000046; 000061, 000062

Editions, revised: 000065, 000066

Editors: Beatty, Willard W (000050)

Fiction: 000012

Folders: 000007, 000088

Indexes: 000091

Joint authors: Palmer, Lawrence J; Noste, Nonan V

Maps: 000016, 000033, 000091

Microfilm cards: 000036

Motion pictures: 000004, 000068

Newspapers: 000060

Paintings: 000040

Periodical articles: 000011, 000017, 000064 (whole issue on Ak.)

Periodicals: 000005

Phonotapes: 000018

Photographs: 000039, 000028

Publishers of esp. interest: Haskell Institute (000050)

Realia: 000014

Separates bound together: 000001, 000002 (continuous paging), 000100 (individual and continuous paging), 000059 (individual paging)

Series analytics: 000013, 000015 (for 000098, 000099)

Series entries: 000098, 000099

Series notes: 000027 (for analytics), 000070 (not analyzed)

Superceded material: 000048

Supplements: 000071

Translations: 000059

SECTION IV

DEVELOPING THE COMPUTER PROGRAMS

As mentioned in Section I, the desired outputs of the machine programming must be determined; mechanical procedures must be essential to those outputs; and feasible programs must be developed to duplicate manual procedures from the point established for machine intervention. It was also stated that constant interchange and adaptation are necessary between manual procedures and machine programming. The following discussion explains the procedures developed in producing the printout given in Part II.

A. Input

1. Data gathering

The input information was assembled and the indexing elements assigned before programs were developed. It was decided that access should be available to the sample bibliography from three separate approaches: author-issuing body, title, and descriptor or subject. With future demands in mind, fairly complete bibliographic information, including copy location, was given in the basic data for the sample items.

2. Keypunching

Data is necessarily arranged so the computer can identify and reproduce it for the indexes indicated above. In the interests of feasible operation, i.e., a minimum of keypunching and machine processing, the following ground rules have been developed after considerable experimenting.

a. In general

(1) Eliminate all punctuation and spacing not essential to clarity of interpretation or to effecient programming.

(2) Use only specified abbreviations in areas of concern to machine alphabetizing. In other areas, words may be truncated or abbreviated at will as long as clarity is maintained, although it is definitely advisable to aim for consistency. The cut off character (letter or numeral) at which abbreviation may begin is set at 25.

(3) Omit the use of "a" and "the" even though these are normally used in the cataloging process.

b. Mechanics

The programs operate on data keypunched into 80 column IBM unit record cards. The first six columns are reserved for the register identification number on all cards except added author or added issuing body cards. In these cards the first six columns are left blank and the identification number appears in parentheses two spaces after the entry. The last two columns are reserved on all cards for the card identification number. The assignment of information to columns 7 through 78 varies with the format of the printout of the type of card concerned. The card numbers are assigned according to the following:

11 through 19 are source register entry cards with card 11 used for the main entry and cards 12 through 19 for additional author or issuing body cards.

21 through 29 are used for descriptive information.

31 through 39 indicate the descriptor, or subject assignment.

41 through 49 are used for title and series entries.

51 through 59 show locations of material and call numbers.

61 through 63 are reserved for "see" and "see also" cross references in the author-issuing body index.

71 is reserved for the "see" cross references in the descriptor index.

81 and 82 are used for the "see also" cross references of the descriptor index.

91 can be used for series "see" and 92 and 93 for series "see also" cross references.

94 through 99, 64 through 69, 72 through 79, and 83 through 89 await future assignment, if needed.

The flexibility of this card assignment is obvious in the amount of information allowable. The 80 column cards have a maximum of 55 to 59 columns available for characters of information beyond those needed for identification numbers, depending on the type of card concerned. Since each set of cards has nine cards available, a large number of characters of information can be recorded. The only area that might be insufficient if greater indexing depth is desired is the 31-39 series. Unassigned card numbers can be used to supplement this series, or more than one descriptor can be entered on a single card. The latter, however, was tried in the present program, but the additional computer processing time and the complicated proof reading of punched cards made this unfeasible.

With but one descriptor allowed per card, then, nine descriptors are allowed in the present program for that was deemed sufficient. In 000083, for example, individual entries are made for the analytics of the reports in the compilation. On the other hand, 000059 handles the three

separate authors as though they were added authors, the titles as though they were additional titles, and the descriptors as though they pertained to the entire volume.

Within the types of cards enumerated above, definite fields or areas for keypunching certain information were set. For instance, the publication date of an item always appears in columns 65 through 68 of the last card used for that item in the 21-29 series.

Besides keypunching specific information in its assigned field, other adaptations were needed. For instance, the spacing of characters in the main and added entries of the source register is planned thus to accomodate the computer rule of filing a space before a character. Thus all "U S " issuing offices will file together before other entries having "U S" as part of the name.

Two allowances for future programming are included in keypunching the data or information. One is the placement of the period after the title on the 21 card, sometimes in a rather surprising location, because of field limitations. Future refinement of the present title program will allow the computer to identify titles without having them specified on the 41-49 cards. The same is true of the series entry enclosed in parentheses as part of the descriptive information on the 21-29 cards.

B. Programming

The programs were kept as simple as possible. They were written mostly in COBOL and used with the IBM 360 D40 computer in the Computer Center at the University of Alaska in Fairbanks. The programs developed were the source register, which serves also as the author-issuing body index in the sample, the title index, the descriptor index, and the proof

copy.

The source register lists the full bibliographic information for each item and includes "see" and "see also" cross references. The title index and the descriptor index identify material by title, publication date, and the assigned register number. "See" and "see also" cross references are possible in both indexes. The proof copy lists all the input information for each item indexed and listed, card by card.

All the programs allow updating, i.e., the addition of new entries. This fact makes them adaptable, as they stand, to the listing and indexing of Alaska related resource material. However, several further refinements are suggested:

1. The field of four characters assigned to the date of publication of an item should be increased to five. This will allow the use of a space or a period after a completed publication date and a dash after that of a continuing publication without truncating the initial numeral in the latter. This will also allow easier user interpretation, but will necessitate repunching one card for each item in the sample, as well as program adaptation.

2. The source register program should be adapted to ignore 31-39 and 41-49 cards, if the latter are used. At present these cards are manually removed to prevent their being printed as part of the source register. With a great quantity of cards manual removal of cards is not feasible.

3. Adapting the title program to identify titles and series from the bibliographic data, rather than from the 41-49 cards, should be evaluated on the basis of keypunching time needed to produce these cards as

opposed to the additional computer processing time entailed when the cards are omitted.

In addition to these refinements, a program must yet be written for the author-issuing body index and for a printout of the descriptors themselves and their cross references. The descriptors will form the partial basis for the compilation of a thesaurus of terms needed for indexing term control and as an aid to the user in his search for information. A variety of other programs can be developed from the basic data as long as indexing elements are tagged in some way, by card numbers, position on a card, spacing, punctuation, or other means.

It is recommended the consultant-programmer who developed the title and descriptor index programs be considered for retention in that capacity when the indexing of Alaska materials is implemented because of his familiarity with the programs and the related indexing problems.

SECTION V

COST ESTIMATE
(For 2 Yrs.)

A. Personnel		
Base Salaries	$239,596.00	
Benefits	18,222.46	
10% Increase-2d year	12,890.92	
Total		$270,709.38
B. Equipment		5,063.10
C. Supplies		3,284.85
D. Travel		6,000.00
E. Contractural Svces.		77,420.00
GRAND TOTAL		$362,477.33

COST ESTIMATE
(For Updating)

The estimated yearly additions to the index are roughly: 2,000 Items with 8,000 index entries, at a cost of $12,000.00 a year.

TABLE 6

ESTIMATE OF IBM CARDS NEEDED AND SIZE OF PRINTOUTS
(Rounded to Thousands)

Type of Material	Number of Items	Number of IBM Cards	Number of Lines in Printouts			
			Source Index	Auth-Issuing Body Index	Title Index	Descriptor Index
Book	27 to 30	270 to 300	138 to 153	43 to 48	35 to 39	81 to 90
Periodical	26 to 28	182 to 196	99 to 106	28 to 31	28 to 31	52 to 56
Newspaper	5	15	—	—	—	10
Other	5	40	27	6	2	10
Total	63 to 68	507 to 551	264 to 286	77 to 85	65 to 72	153 to 166

Note:
1. No entries in the source, main & added entry, or title index allowed for newspapers.
2. No title entries are considered for archival material, calculated under other above.
3. Printout estimate for descriptor index shows lines needed for entries alone. An estimate 8 to 10,000 is made for the descriptors themselves, depending a great deal on the number of names and places indexed.
4. Fewer cards will need to be punched if program adaptations and refinements are made to eliminate typing of title cards.

COST ESTIMATE DETAIL

A. Personnel

	Total Project Work-wks	Grade or Pay Scale	Personnel Equiv.
1. Administering			
a. Working Director	104	$22,000	2
b. Secretary	104	9	2
c. Bookkeeper & Gen.Off.	52	8	1
2. Searching, Record.,Filing	130	7	2.5
3. Indexing			
a. Locating copy,etc.	104	6	2
b. Indexing & thesaurus			
(1) Professional	104	$12,000	2
(2) Clerical	446	8	8.5
4. Keypunching & Verifying			
a. Working supervisor	104	9	2
b. Punchers & verifiers	186	7	3.5
5. Summary			
a. Professional			
(1) $22,000/yr	$44,000.00		
(2) $12,000/yr	24,000.00		$68,000.00
b. Clerical			
(1) Grade 6 @ $7,009/yr.	$14,018.00		
(2) Grade 7 @ 7,550/yr.	45,300.00		
(3) Grade 8 @ 8,132/yr.	77,254.00		
(4) Grade 9 @ 8,756/yr.	35,024.00		$171,596.00
c. Grand Total			$239,596.00

B. Equipment Detail

5 Work Tables	$450.00
18 Chairs	492.00
6 Booktrucks	302.50
5 Desks	828.00
5 Typewriter Stands	90.00
28 Steel Card Storage Cabinets	476.00
4 Units Metal Shelving	240.00
3 Dictionary Stands	55.50
6 Book Racks	60.00
2 Storage Cabinets	141.10

B. Equipment (Cont.)

1 Locker Cabinet	36.00	
5 Typewriters	1300.00	
1 Adding Machine	92.00	
Freight on above	500.00	$5,063.10

C. Supplies

70,000 Catalog Cards	280.00	
10 pkgs. Guide Cards	30.00	
100 Drawer Labels		
2 Rolls Adding Paper		
500 File Folders		
50 Expandable Folders		
9 File Trays, Letter Size		
10 Wood Sorting Trays		
Stationery, Office Supplies, etc. Total of above	674.85	
500,000 IBM Unit Record Cards	700.00	
20 Reels Tape for Computer	400.00	
Mailing & Postage, incl. charges on loaned material	1200.00	$3,284.85

D. Travel

Outside Ak. & per diem	4,500.00	
Inside Ak. & per diem	1,500.00	$6,000.00

E. Contractural Svces.

Programmer-Consultant & Assistants in other libraries	8,000.00	
Rental: 2 Keypunches & Verifiers	7,680.00	
Rental: Card Storage	240.00	
Telephone, Telex, Telegram Svce.	2,000.00	
Computer: debugging & Process.	7,000.00	
Duplicating Svces.	1,500.00	
Reproduction of 250 Copies of Printout for Distribution	35,000.00	
Rental: Quarters	16,000.00	$77,420.00

APPENDIX A

Introduced: 3/26/71
Referred: Health,Welfare and Education and Finance

IN THE HOUSE

BY HOLM,CHANCE,COLLETTA, FARRELL AND SPECKING

HOUSE CONCURRENT RESOLUTION NO. 29

IN THE LEGISLATURE OF THE STATE OF ALASKA

SEVENTH LEGISLATURE - FIRST SESSION

Relating to the indexing of Alaska materials.

BE IT RESOLVED BY THE LEGISLATURE OF THE STATE OF ALASKA:

WHEREAS a vast amount of material has been and is being published daily which pertains to Alaska and which is sorely needed by students, researchers and governmental employees, as well as numerous other interested citizens; and

WHEREAS the last general index to Alaskana materials was A Bibliography of Alaskan Literature, 1724-1924, by Judge James Wickersham, and there has been no index to material published since that time; and

WHEREAS the federal government as well as other governmental entities and private persons have all been major publishers of materials dealing with Alaska; and

WHEREAS modern technology would allow the creation of an indexing system compatible with the utilization of computers and which would have a thesaurus of terms to the benefit of all users;

BE IT RESOLVED by the Alaska Legislature that the Department of Education is requested to take all necessary steps toward development of such an updating of indexing to Alaska materials as the first project in a long-range program to provide bibliographic control and access to materials on Alaska.

APPENDIX B: SEARCH TERMS

ADMINISTRATION & GOVERNMENT
ADMINISTRATION OF SCHOOLS
AERIAL MAPPING
AERIAL MAPS
AERIAL RECONNAISSANCE
AEROLOGY
AERONAUTICS
AGRICULTURAL IMPLEMENTS & MACHINERY
AGRICULTURAL COLONIZATION
AGRICULTURE
AHTENA INDIANS
AIR
AIRBASE CONSTRUCTION
AIRLINES
ALASKANS
ALEKNAGIK
ALEUTIAN ISLANDS
ALEUTIAN LIVESTOCK CO., INC.
ALEUTS
ALGAE
ALUMINUM
AMCHITKA ISLAND
ANCHORAGE
ANTHROPOLOGY
ANTIMONY MINES & MINING
ANTIMONY ORES
ANTIQUITIES
APPROPRIATION & EXPENDITURES
ARACHNIDS
ARCHEOLOGY
ARCHITECTURE
ARSENIC
ART
ATHAPASKAN INDIANS
ATMOSPHERIC ELECTRICITY
ATMOSPHERIC PRESSURE
ATOMIC BOMBS TESTING
ATOMIC ENERGY
AURORAS
AUTOMOBILE SERVICE STATIONS
AVIATION
BANKING LAWS & REGULATIONS
BANKS & BANKING
BEARS
BEETLES
BERING SEA
BERTHA, MT.
BIBLIOGRAPHY
BIRDS
BISON
BOATS & BOATING
BOTANY
BOTTOM SEDIMENTS
BOUNDARIES
BRACHIPODS
BUILDING
BUILDING INDUSTRY
BUTTERFLIES & MOTHS
CAMPING
CARIBOU
CEDAR
CEREALS
CHEMICAL INDUSTRIES
CHILD HEALTH & WELFARE
CHRISTMAS
CHROMIUM MINES & MINING
CHROMIUM ORES
CITY PLANNING

CLIMATE
COAL
COAL MINES & MINING
COLONIZATION & SETTLEMENT
COMMERCE
COMMERCIAL AERONAUTICS
COMMUNICATIONS
CONSERVATION OF RESOURCES
CONSTITUTION
COOPERATIVES
COPPER
COPPER MINES & MINING
COPPER ORES
COURTS
CRUSTACEANS
CURRENTS
DAMS
DEFENSES
DENBIGH FLINT COMPLEX
DIET & NUTRITION
DISCOVERY
DISEASE
EARTHQUAKES
ECHINODERMS
ECOLOGY
ECONOMIC CONDITIONS
ECONOMIC GEOGRAPHY
ECONOMIC POLICY
EDUCATION
ELECTIONS
ELECTRIC LINES
ELECTRIC POWER
ELK & MOOSE
ENGINEERING
ENGINEERING EDUCATION
ENVIRONMENTAL POLICY
EROSION
ESKIMO DOGS
ESKIMOS
EXPEDITIONS
EXPLORATION
EYAK
FAIRBANKS
FEDERAL & STATE REGULATIONS
FEDERAL GOVERNMENT
FINANCE
FISH PROCESSING
FISHERIES
FISHERY LAWS & LEGISLATION
FISHES
FISHING
FISHING & FISH, COMMERCIAL
FISHING INDUSTRY
FLIGHTS
FLOODS
FOOD
FOOD SUPPLY
FORAGE CROPS
FOREST FIRES
FORESTS & FORESTRY
FORRESTER ISLAND
FOXES
FRESH-WATER FAUNA
FRONTIER & PIONEER LIFE
FROST
FROZEN GROUND
FUNGI
FUR TRADE
GAME COMMISSION
GAME LAWS

GAME PRESERVES & SANCTUARIES
GARDENS
GARDENS & GARDENING
GEODETIC SURVEYS & SURVEYING
GEOGRAPHY
GEOLOGY
GEOPHYSICAL INSTITUTE, UNIV. OF AK.
GEOPHYSICAL INVESTIGATIONS
GLACIAL EPOCHS
GLACIAL GEOLOGY
GLACIERS
GOLD
GOLD MINES & MINING
GRAVITY
GREEK CHURCH IN AMERICA
GROUND TEMPERATURE
GULF OF AK.
HALIBUT & HALIBUT FISHERIES
HEATING EQUIPMENT & SYSTEMS
HISTORY
HOSPITALS
HOUSING
HUNTING
HUNTING & TRAPPING
HYDROELECTRIC PLANTS
HYDROLOGICAL SURVEYS & SURVEYING
HYDROLOGY
ICE
ICE AGE
ICE FOG
IMMIGRATION & EMIGRATION
INDIANS
INDIANS, - SEE ALSO NAMES OF TRIBES
AHTENA, ATHAPASKAN, EYAK, INGALIK, KOYUKON, KUTCHIN, NA-DENE, TANAINA, TINNE, TANANA, TLINGIT, TSIMSHIAN
INDUSTRIES & RESOURCES
INDUSTRY
INGALIK INDIANS
INSECTS
IONOSPHERE
IRON ORES
JADE
JUNEAU
KATMAI, MT.
KENAI PENINSULA
KLONDIKE
KLONDIKE GOLD-FIELDS
KODIAK
KODIAK ISLAND
KOTZEBUE SOUND
KOYUKON INDIANS
KUTCHIN INDIANS
LAKES
LAND
LAND TENURE
LANDSCAPE PROTECTION
LAW
LAWS, REGULATIONS, ETC.
LEAD ORES
LEGISLATION
LEMMINGS
LEMMINGS, MICE & VOLES
LIBRARIES
LICHENS
LIMINOLOGY
LIQUOR PROBLEMS
LIVESTOCK & STOCK
MCKINLEY, MT.

MCKINLEY NATIONAL PARK
MAGNETIC SURVEYS
MAMMALS
MAN
MAPS
MAPS & MAPPING
MATANUSKA
MATANUSKA VALLEY
MEDICAL RELIEF WORK
MERCURY MINES & MINING
METALS & MINERALS
METEOROLOGY
METLAKATLA
MICROCLIMATE
MINERAL RESOURCES
MINERALOGY
MINES & MINERAL RESOURCES
MINES & MINING
MISSIONS
MOLLUSKS
MOOSE
MOSQUITOES
MOSSES & LIVERWORTS
MOUNTAINEERING
MOUNTAINS
MUSIC
MUSIC EDUCATION
MUSIC FESTIVALS
MUSK OX
NA-DENE INDIANS
NAMES, GEOGRAPHIC
NATIVE RACES
NATURAL GAS
NATURAL RESOURCES
NEGROES
NEWSPAPERS
NOMADISM
NOME
NORTHERN AK.
NUNIVAK ISLAND
NURSES & NURSING
NUTRITION PROBLEMS
OCEANOGRAPHY
OIL & GAS
OIL & GAS LEASES
OIL & GAS SUPPLY & PRODUCTION
OIL FUEL INDUSTRY
PALEOBOTANY
PALEOCLIMATOLOGY
PALEONTOLOGY
PALMER
PALMER AIRPORT
PAPER
PAPER INDUSTRY
PARKS & RESERVES
PEAT BOGS
PERMAFROST
PETROCHEMICALS INDUSTRY
PETROLEUM
PETROLEUM INDUSTRY
PETROLEUM INDUSTRY & TRADE
PETROLEUM LAWS & REGULATIONS
PETROLEUM PIPELINES
PETROLOGY
PHOTOGRAPHY
PHOTOINTERPRETATION
PHYSICAL GEOGRAPHY
PHYTOGEOGRAPHY
PIPELINES
PLACER MINING

PLUMBING TRADE
POINT HOPE
POLAR STATIONS
POLITICS & GOVERNMENT
POLLEN
POPULATED PLACES
POPULATION
PORTS
PRIBOLOF ISLANDS
PRINCE WILLIAM SOUND
PROSTITUTION
PROTESTANT CHURCHES
PTARMIGAN
PUBLIC HEALTH
PUBLIC WORKS
PURCHASE, 1867
RADAR
RADIO
RADIOACTIVE DEPOSITS
RAILROADS
READING
RECREATION
REGIONAL PLANNING
REINDEER
RELIGIOUS INSTITUTIONS & AFFAIRS
RETAIL TRADE
RIVER & LAKE ICE
ROADS
RODENTS
ROUTES
RUSSIANS IN AK.
SAFETY EDUCATION
ST. LAWRENCE ISLAND
ST. PAUL ISLAND
SALINITY
SALMON
SALMON & SALMON FISHERIES
SAND DUNES
SEALING
SEALS
SECURITIES
SEDIMENTATION
SEWAGE & GARBAGE DISPOSAL
SEWARD PENINSULA
SEWERAGE
SHEEP
SHORE LINES
SILVER MINES & MINING
SILVER ORES
SITKA
SITKA MAGNETIC OBSERVATORY
SKAGWAY
SNOW
SOCIAL CASEWORK WITH CHILDREN, SEE
CHILD HEALTH & WELFARE
SOCIAL CONDITIONS
SOILS
SOLAR RADIATION
SOUTHEAST AK.
SQUIRRELS
STATEHOOD
STIKINE RIVER
TANAINA INDIANS
TANANA INDIANS
TEACHERS PENSIONS & RETIREMENT
TEACHERS SALARIES
TEACHING
TEMPERATURE
TERRITORIAL LIBRARY BOARD
THORIUM

TIN MINES & MINING
TIN ORES
TINNE INDIANS
TINNE LANGUAGES
TLINGIT INDIANS
TOPOGRAPHICAL SURVEYS
TOURIST TRADE
TRADE & COMMERCE
TRANSPORTATION
TREE RING ANALYSIS
TREES
TSIMSHIAN INDIANS
TUNGSTEN ORES
UNEMPLOYMENT
U.S. AIR FORCE
U.S. EDUCATION OFFICE
UNITS OF WORK
UNIV. OF AK.
UNIV.OF AK. EDUCATION DEPT.
UNIV. OF AK. SCHOOL OF MINES
URANIUM MINES & MINING
VEGETATION
VOCATIONAL EDUCATION
VOLCANOES
VOLCANOES & VOLCANOLOGY
WAGES
WATER & WATERCOURSES
WATER POLLUTION
WATER POWER
WATER SUPPLY
WATER, UNDERGROUND
WAVES
WILDERNESS AREAS
WILDLIFE CONSERVATION
WILDLIFE CONSERVATION & MANAGEMENT
WIND
WIND, UPPER AIR
WOLVES
WOMEN
WOOD INDUSTRY
WORMS
YUKON RIVER
ZINC MINES & MINING
ZINC ORES
ZOOLOGY

The above terms were found as subject/descriptor terms under which Alaska related material was found during the study of indexes made by this pilot study.

APPENDIX C

PARTIAL LIST OF ALASKA RELATED PERIODICALS*

Airlift
Alaska
Alaska Alumnus
Alaska and Northwest Quarterly
Alaska Baptist Messenger
Alaska Call
Alaska Conservation Review
Alaska Construction and Oil
Alaska Construction News
Alaska Economic Trends
Alaska Education News
Alaska Employment Trends
Alaska Farmer
Alaska Federationist
Alaska Fish Tales and Game Trails
Alaska Fisherman
Alaska Forum
Alaska From the Inside
Alaska Heart
Alaska Herald
Alaska History News
Alaska Industry
Alaska Journal
Alaska Land Lines
Alaska Law Journal
Alaska Libraries
Alaska Life
Alaska Local Government
Alaska Magazine
Alaska Magazine and Canadian Yukoner
Alaska Market News
Alaska Medicine
Alaska Monthly Magazine
Alaska Music Educator
Alaska News and Information Service
Alaska News Review
Alaska Newsletter
Alaska Northern Lights
Alaska Nurse
Alaska Pebble Patter
Alaska Pioneer
Alaska Presbyterian
Alaska Railroad Record
Alaska Reporter
Alaska Resident
Alaska Review
Alaska Review of Business and Economic Conditions
Alaska School Bulletin
Alaska Scouting Service
Alaska Shellfish Landings
Alaska Sportsman
Alaska Statistical Quarterly (became Statistical Quarterly)
Alaska Teacher
Alaska Weekly Crop and Weather Report
Alaska Woman
Alaska-Yukon Magazine
Alaskan
Alaskan Agriculturist
Alaskan Churchman
Alaskan Magazine
Alaskan Quarterly

Alaskan Reporter

Alaska's Health (became the following title)

Alaska's Health and Welfare (became the following title)

Alaska's Health, Welfare and Corrections

Alaska's Manpower Outlook

Alcoholism in Alaska

Arctic

Arctic and Alpine Research

Arctic Anthropology

Arctic Circular

Arctic Development Digest

Arctic News

Arctic Newsletter

Arctic Oil Journal

Arti-Facts

Bear Growls

Beaver

Building Alaska

Bulletin Alaska Division of Gas and Oil

Bulletin Alaska Labor Union

Bulletin Alaska Ornithological Society

Bulletin Alaska Territorial Federation of Labor

Centennial Press

Climatological Data

Conservation Corner

Counseling - HRD Happenings

Dean

Descent

Direction

Econofacts

Economic Analysis

Eskimo

Farm Bulletin

Flag

Frontier

Glacier

High Water News

Information Letter Alaska National Guard

Klondike Miner

Klondike News

Labor Demand Bulletin

Labor Supply Bulletin

Local Climatological Data

Magpie

Manpower

Midnight Sunliner

Milestones

Mines and Petroleum Bulletin (became Mines Bulletin)

Mines Bulletin

Moose Gooser

Municipal News

Museum Newsletter

Nanook News

Native News

Native News and B.I.A. Bulletin

Native People

New Alaskan

News Bulletin Alaska Conservation Society (became Alaska Conservation Review)

News Bulletin Alaska Society of Medical Technologists (became Northern High-Lights)

Newsletter Alaska Historical Society

Newsletter Alaska Instructional Media Assn.

Newsletter Alaska Library Assn. (became Sourdough)

Newsletter Alaska State Library Assn. (became Newsletter Alaska Library Assn.)

Newsletter Arctic Village Demonstration Project

Newsletter Cook Inlet Historical Society

Northern High-Lights

Northern Libraries Bulletin

Now In the North

Pathfinder

Polar Notes

Polar Record

Polar Times

Quarterly Report on Alaska Food Prices

Railbelt Reporter

Revenue News

Sanitation Aid

SCREE

Seismological Bulletin Aleutian Seismic Program

Something New! For Homemakers

Sourchako

Statistical Quarterly

Stella Borealis

Summer Times

Talking Totem

This Month in Alaska

Village Voice

Wainwriter

What's Developing in Alaska

Wien Alaska Arctic Liner

* This list covers only periodicals from 1925 on. Those published before 1925 can be located in Wickersham's bibliography.

APPENDIX D

ALASKA RELATED NEWSPAPERS+

Alaska
Alaska Appeal
*Alaska Business
Alaska Capital
Alaska Catholic
Alaska Citizen
Alaska Daily Capital
Alaska Daily Dispatch
Alaska Daily Empire
Alaska Daily Guide
Alaska Daily Press
Alaska Daily Record
Alaska Dispatch
Alaska Evening Post
Alaska Evening Record
Alaska Examiner
Alaska Forum
Alaska Free Press
Alaska Frontier
Alaska Herald (San Francisco)
Alaska Herald (Sitka)
Alaska Journal
Alaska Journal-Express
Alaska Journalist
Alaska Labor News
Alaska Labor Union Bulletin
Alaska Legionnaire
Alaska Miner
Alaska Mining Record
Alaska News
Alaska Pioneer
Alaska Press
Alaska Prospector
Alaska Railroad Record
Alaska Record-Miner
Alaska Searchlight
Alaska Sentinel
Alaska Service Record
Alaska Sourdough
Alaska Sunday Morning Post
Alaska Sunday Press
Alaska Times (Cordova)
Alaska Times (Sitka)
Alaska Travelers Guide
Alaska Tribune
Alaska Truth
Alaska Weekly
Alaska Weekly Post
Alaska Weekly Transcript
Alaskan (Anchorage)
Alaskan (Cordova)
Alaskan (Petersburg)
Alaskan (Sitka)
Alaskan World
*Alaskana
*All Alaska Weekly
Anchorage Alaskan
Anchorage Daily Alaskan
*Anchorage Daily News
*Anchorage Daily Times
Anchorage Daily Times & Cook Inlet Pioneer
Anchorage Labor News
Anchorage News

Anchorage Sunday Times
Anchorage Weekly Alaskan
Anchorage Weekly Democrat
Anchorage Weekly Times
Anchorage Weekly Times & Alaska Labor News
Anchorage Weekly Times & Cook Inlet Pioneer
Arctic Weekly Sun
Avalanche
Bennett Sun
Boob
Bristol Bay Digest
*Buffalo
Chalkyitsik Newspaper
*Chechako News
Chena Herald
*Chilkat Valley News
Chilkoot Post
Chitna Leader
Circle Hot Air Budget
Commoner
*Cook Inlet Courier
Cook Inlet Pioneer
Cook Inlet Pioneer & Knik News
Copper Bee
Copper River Current
Cordova Daily Alaskan
Cordova Daily Herald
Cordova Daily Times
*Cordova Times
Cordova Weekly Times
Council City News
Council Evening News Bulletin
Council News Bulletin
Daily Alaska Citizen
Daily Alaska Dispatch
Daily Alaskan
Daily Bulletin
Daily Evening Record
Daily Miner
Daily Morning Sun
Daily Nome Industrial Worker
Daily Progressive-Miner
*Daily Sentinel
Daily Sitka Sentinel
Daily Sitka Sentinel & Arrowhead Press
Daily Tanana Tribune
Dawson Daily News
Dawson News
Dawson Weekly News
Democrat
Diamond Drill
Douglas Island News
Douglas Miner
Dyea Press
Dyea Trail
Eagle City Tribune
Eielson Friendly Times
Esquimeaux
Evening Record
*Fairbanks Daily News-Miner
Fairbanks Daily Times
Fairbanks Evening News
Fairbanks Facts
Fairbanks Focus
Fairbanks Gazette
Fairbanks Herald
Fairbanks Miner
Fairbanks News

Fairbanks Record
Fairbanks Sunday Times
Fairbanks Times
Fairbanks Weekly News
Fairbanks Weekly Times
Farthest-North Collegian
Flat Can Opener
Fort Seward News
Forty-Ninth Star
Free Press
*Frontiersman (Palmer)
Frontiersman (Seldovia)
Gleam
Haines Pioneer Press
Homer News
Hot Springs Echo
Hot Springs Echo & Tanana Citizen
Hot Springs Post
Hyder Alaska Miner
Iditarod Nugget
Iditarod Pioneer
Innoko Miner
Interloper
Island Star
Jessen's Daily
Jessen's Weekly
Juneau Alaska Empire
Juneau City Mining Record
Juneau Daily Capital
Juneau Daily Transcript
Juneau Free Lance
Juneau Independent
Juneau "J" Bird
Juneau Journal
Juneau Spirit
Juneau Sunday Capital
Katalla Herald
Kenai Peninsula Pioneer
Ketchikan Alaska Chronicle
*Ketchikan Daily News
Ketchikan Daily Progressive-Miner
Ketchikan Miner
Ketchikan Mining Journal
Ketchikan Morning Mail
Ketchikan Times
Ketchikan Weekly Journal
Klondike News
Klondike Nugget
*Knik Arm Courier
Knik News
Kodiak Bear
Kodiak Hospital News
*Kodiak Mirror
Kodiak Pictorial News
Kodiak Shopping News
Kotzebue News
Kusko Times
*Kuskokwim Kronicle
Lynn Canal Weekly
Mailboat Monitor
Matanuska Valley Pioneer
Matanuska Valley Post
Mayo-Keno Bulletin
Midnight Sun
Miner
Miners' Union Bulletin
Modern Methods
Morning Alaskan
Mukluk Telegraph
Nenana Daily News

Nenana News
New Alaskan
News-Letter
Nome Business Directory
Nome Chronicle
Nome Daily Chronicle
Nome Daily Gold Digger
Nome Daily News
Nome Daily Nugget
Nome Democrat
Nome Gold Digger
Nome Industrial Worker
Nome News
*Nome Nugget
Nome Pioneer Press
Nome Semi-Weekly News
Nome Weekly Chronicle
North Star
Northern Light
On the Kenai
Optimist
Petersburg Herald
*Petersburg Press
Petersburg Progressive
Petersburg Weekly Report
Petticoat Gazette
Pilot
*Pioneer
Pioneer All-Alaska Weekly, see All Alaska Weekly
Pioneer Scout
*Polar Star
Porcupine Nugget
Porcupine Quill
Rampart Miner
*River Times
Ruby Citizen
Ruby Record
Ruby Record-Citizen
Saturday Mail
Seward Daily Gateway
Seward Gateway
*Seward Phoenix Log
Seward Polaris & Kenai Peninsula
Seward Aleutian Chain News
Seward Seaport Record
Seward Tribune
Seward Weekly Gateway
Sitka Cablegram
Sitka Post
Sitka Progress
Sitka Sentinel
Sitka Sun
Sitka Times
Sitka Tribune
Skagway Cheechako
Skagway Daily Budget
Skagway News
Socialist Press
*Sourdough Sentinel
*Southeast Alaska Empire
*Spectrum
Spenard Life
Standard
Stickeen River Journal
Stroller's Weekly
Sunday Alaska Dispatch
Sunday Life
Tanana Citizen
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Tanana Miner
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Tanana News
Tanana Teller
Tanana Tribune
Tanana Valley Socialist
Teller Advertiser
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Truth (Cordova)
Truth (Valdez)
*Tundra Times
Valdez Breeze
Valdez Commoner
*Valdez-Copper Basin News
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+ This listing is based on Wickersham's bibliography and other sources, but is by no means exhaustive.

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PART II

PRINTOUT OF SAMPLE BIBLIOGRAPHY

AND INDEXES

PART II

PRINTOUT OF SAMPLE BIBLIOGRAPHY AND INDEXES

The following copy of the computer printout developed by this pilot study consists of three parts. The first is the basic bibliography or source register index to Informational Resources on Alaska. It contains the identifying information for each of the 106 items indexed. The main and additional author entries therein are numbered in alphabetic sequence so that this part serves also as the author-issuing body index. The second and third parts are the title index and the subject descriptor index, respectively. The entries in these last two indexes, as well as the added author and issuing body entries (given in the source register), refer the user to the full information for each item indexed by giving in parentheses the entry number under which it can be found in the first part, the source register. For instance, the first entry in the title index is "AGRICULTURE HANDBOOK 5", published in 1950 and described in entry 000066. In the subject descriptor index under "TREES" the same reference is cited. Again, under the name "LITTLE" in the first part, the reference is repeated. Thus, the user can locate information in the source register when he knows the author, co-author, title, or subject of the item indexed.

It will be noted that all letters are in upper case because of the computer used, that punctuation is used only when necessary for clarity or for programming, and that words are truncated or abbreviated. Filing by computer, alphabetically from left to right with every space or letter

considered, has made it necessary to allow arbitrary abbreviating or truncating only with space 25 and following. Certain abbreviations have been allowed for all except initial words, except in the case of U S, in the spaces 1 through 24 in the main, added author, title and descriptor entries. These are as follows:

ADMIN	ADMINISTRATION	EXP	EXPERIMENT
ADVIS	ADVISORY	HEAR	HEARING
AK	ALASKA	MISC	MISCELLANEOUS
BULL	BULLETIN	OFF	OFFICE
BUR	BUREAU	PROF	PROFESSIONAL
CO	COMPANY	PUB	PUBLICATION
COM	COMMITTEE	SER	SERIES
CONF	CONFERENCE	STA	STATION
DEPT	DEPARTMENT	U S	UNITED STATES

The following abbreviations are used to identify the periodicals from which articles have been indexed:

AKJ	ALASKA JOURNAL
CMFR	COMMERCIAL FISHERIES REVIEW
CONR	CONGRESSIONAL RECORD
EQUIB	EARTHQUAKE INFORMATION BULLETIN
HOBB	HOBBIES
SMSI	SMOKE SIGNALS
WAIN	WAINWRITER
WELV	WELFARE IN REVIEW

It is envisioned that this printout will be photographically reduced before copies of the completed index are produced for distribution. Not only will this cut down on the number of pages, but it should also trim a sizable amount from the $35,000 estimate for producing 250 copies.

INFORMATION RESOURCES ON

ALASKA

SOURCE REGISTER

INFORMATION RESOURCES ON

ALASKA

SOURCE REGISTER

000001 ABERCROMBIE, WILLIAM R 1857-
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